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CLOSURE PLAN FOR MIXED RESIDUE RECOVERY INCINERATOR BUILDING 771, ROOM 149

Identification Number: CO7890010526

U.S. Department of Energy
Rocky Flats Plant
P.O. Box 928
Golden, Colorado 80402

FEBRUARY 5, 1991

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FIGURES

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REGULATORY CHECKLIST FOR CLOSURE OF THE BUILDING 771 INCINERATOR

For the purposes of this closure plan, the "facility" under discussion is the Mixed Residue Recovery Incinerator unit at the Rocky Flats Plant This checklist outlines the state regulations that apply to the closure of the incinerator State regulations are specified in the Colorado Hazardous Waste Regulations 6 CCR 1007-3 Part 265 The closure plan section(s) identifies the location in this document that addresses the appropriate state regulations

CLOSURE AND POST-CLOSURE REQUIREMENTS	INCLUDED IN PLAN (Y/N/NA)	6 CCR 1007-3 SECTIONS	CLOSURE PLAN SECTIONS
Closure Performance Standard	Y	265 111	3 2 3 3 5 2 2 5 2 5
Partial and Final Closure Activities	Y	265 112(b)1 265 112(b)4 265 112(b)5 265 118(c)	3 3 4 0 5 2 2 5 2 6 9 0
Maximum Waste Inventory	Y	265 112(b)3	2 2 3
Inventory Removal, Disposal or Decontamination of Equipment	Y	265 112(b)3 265 112(b)4 265 112(b)5 265 112(e) 265 351	5 2 - 5 5

CLOSURE AND POST-CLOSURE REQUIREMENTS	COMPLETE (Y/N/NA)	6 CCR 1007-3 SECTIONS	CLOSURE PLAN SECTIONS
Demonstration of Success of Decontamination	Y	265 112(b)4	5 3
Schedule for Closure	Y	265 113(a)(b)	3 4
Extension for Closure Time	Y	265 113(b)1	3 4
Closure Certification	Y	265 115	10 0
Closure Cost Estimate	NA	266 12 266 14	8 0

CLOSURE PLAN FOR
MIXED RESIDUE RECOVERY INCINERATOR
BUILDING 771, ROOM 149

1.0 INTRODUCTION

1 1 Plant Location and Mission

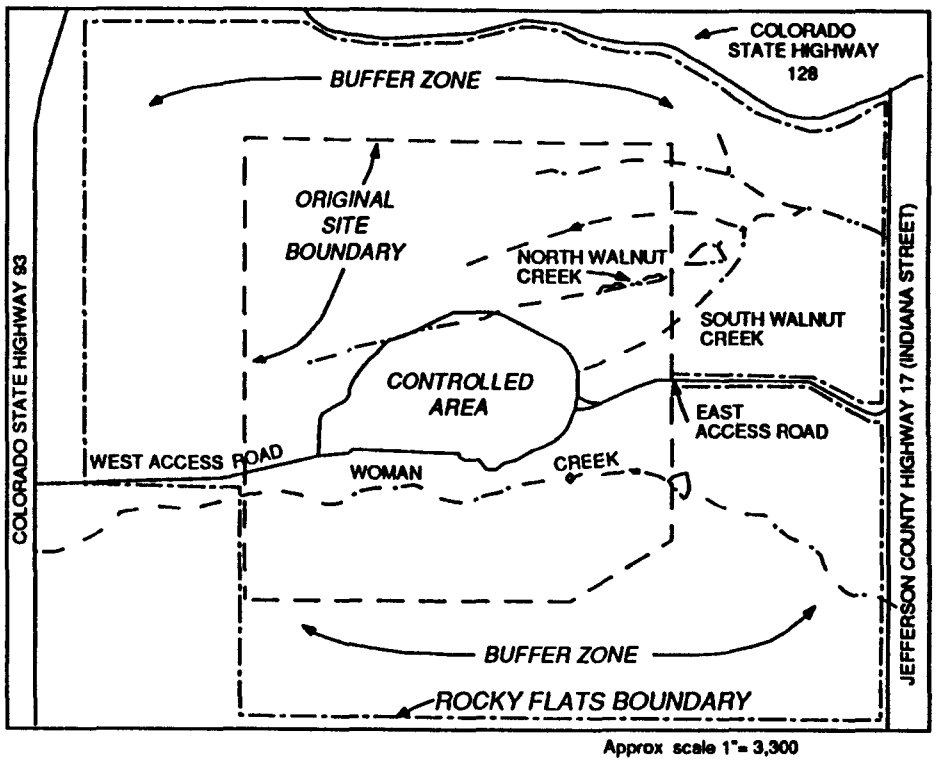
The U S. Department of Energy's (DOE's) Rocky Flats Plant (RFP) is located in north-central Colorado, northwest of the City of Denver (Figure 1) The RFP is located in Sections 1 through 4 and 9 through 15 of T 2 S , R 70 W. of the 6th Principal Meridian The facility's Environmental Protection Agency identification number is CO7890010526 The mailing address is:

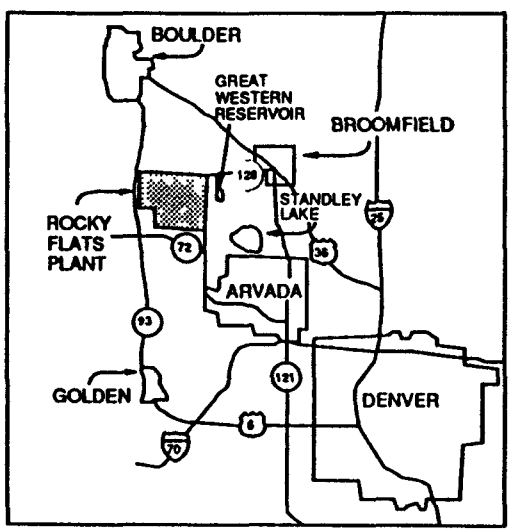
U S Department of Energy
Rocky Flats Plant
P O Box 928
Golden, CO 80402

The DOE facility contact for this unit is

Mr Robert M Nelson, Jr.
Manager
DOE Rocky Flats Office
(303) 966-2025

EG&G Rocky Flats, Inc., is the prime operating contractor for RFP (since January 1, 1990) under the general direction of the DOE, Rocky Flats Office As a government-





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VICINITY MAP

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BUILDING 771 INCINERATOR
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FIGURE 1

owned and contractor-operated facility, the RFP comprises a portion of the nationwide nuclear weapons production complex The primary RFP mission is to produce plutonium components for nuclear weapons Plutonium, uranium, beryllium, and stainless steel parts are fabricated at the RFP and shipped off-site for final assembly Additional activities include chemical processing to recover plutonium from scrap material, metallurgical research and development, machining, assembly, non-destructive testing, coatings research, remote engineering, chemistry, and physics. Waste handling operations at the RFP include storage, transport, treatment, and packaging of waste materials generated onsite The waste forms that are handled at the RFP include non-hazardous, non-radioactive, low-level radioactive, transuranic (TRU) radioactive, and hazardous waste as well as combinations thereof Combinations of radioactive and hazardous wastes are considered "mixed wastes " Resource Conservation and Recovery Act (RCRA-) regulated wastes at the RFP include hazardous, low-level mixed, and TRU mixed wastes. In addition, "mixed residues" are considered RCRA-regulated "Residue" is a by-product of plutonium production processes which contain plutonium concentrations above the DOE Economic Discard Limit (EDL) Residues which are mixed with hazardous wastes are called "mixed residues".

This closure plan addresses the Building 771 Mixed Residue Plutonium Recovery Incinerator (771 Incinerator) which was an integral process in the recovery of plutonium from residues and mixed residues. The 771 Incinerator was used to combust residue materials, thereby concentrating the plutonium into ash from which the plutonium could be recovered. In response to a lawsuit filed by the Sierra Club in August 1989, DOE agreed not to operate the 771 Incinerator without a RCRA permit In addition, as a part of the Mixed Residue Compliance Plan, the DOE determined that operation of the 771 Incinerator could not comply with current RCRA regulatory requirements and that a closure plan for the 771 Incinerator would be filed with the Colorado Department of Health (CDH)

1 2 Closure Plan Purpose

This closure plan provides a strategy, method, and schedule for closure of the 771 Incinerator system, located in Rooms 149 and 249 of Building 771, in compliance with the Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Part 265 closure regulations and in accordance with the Mixed Residues Compliance Plan dated September 28, 1990 It is currently expected that the entire glovebox system and off-gas management system dedicated to the 771 Incinerator will be removed and properly disposed of at an approved off-site facility The portions of Rooms 149 and 249 in which the incinerator and off-gas systems are currently located will be certified as closed following removal of the incinerator and verification of decontamination The decontaminated portions of Rooms 149 and 249 will be returned to use for other activities

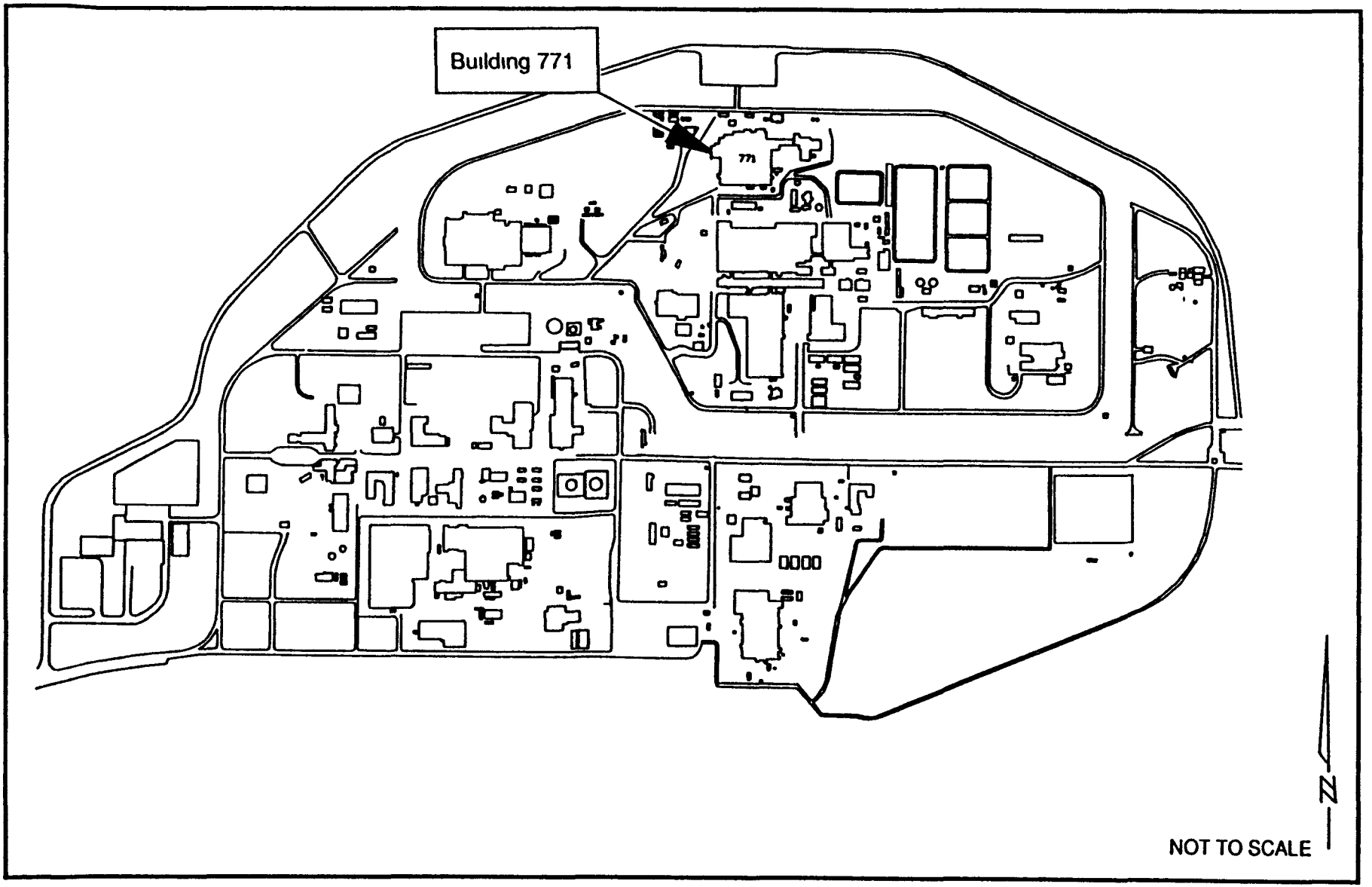
2.0 FACILITY DESCRIPTION

2 1 Facility Location and Specifications

2 1 1 Incinerator Location

Building 771 is located in the northern portion of the Perimeter Security Zone (PSZ) (Figure 2) The 771 Incinerator is located predominantly in Room 149 of the first floor of Building 771. Some of the off-gas control system dedicated to the incinerator is located in Room 249, on the second floor immediately above Room 149 Room 149 is a large room with a number of operations, only one of which is the incinerator. The floor of room 149 is constructed on underlying soils, there is no basement beneath Building 771 There are no apparent cracks in the floor that would provide a pathway to soils and groundwater. The 771 Incinerator is located in the southwest corner of Room 149 The following physical characteristics pertain to the area of Room 149 in which the 771 Incinerator is located·

- Ceiling is 18 feet high,
- Area is roughly a rectangular shape with the northeast corner missing,
  - Approximately 63 feet long (north-south),
  - Approximately 18 feet wide (east-west),
  - Missing corner is 23 feet (north-south) by 8 feet (east-west),
  - Total incinerator floor space is approximately 950 square feet,
- The floor is constructed of concrete and is sealed with epoxy paint,
- The west and south bounding walls of the incinerator area consist of concrete or cinder block sealed with epoxy paint,



SITE PLAN

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FIGURE 2

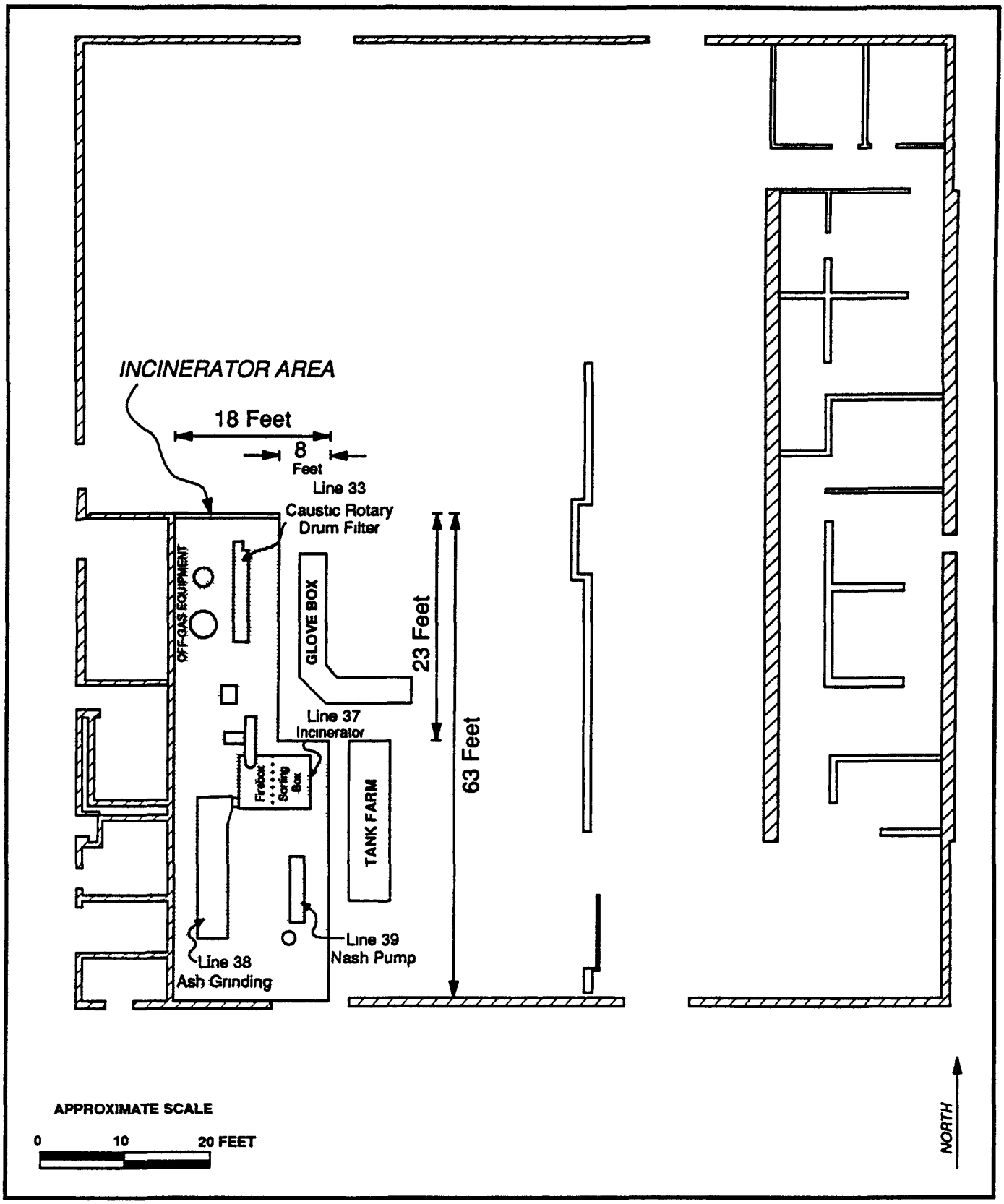
- The north bounding wall of the area consists of drywall sealed with epoxy paint, and

- There is no bounding wall to the east of the incinerator area to separate it from the rest of Room 149

The purpose of sealing the floor and walls with epoxy paint is to provide a smoother surface on the floor and walls to allow for easier removal of dust and other materials from the floor and walls of the room Sealing of the floors also prevents potential seepage of hazardous wastes into soils and groundwater A diagram showing the layout of the incinerator area of Room 149 is provided in Figure 3

The filter plenum and its blowers are located in Room 249 The physical dimensions of that area are approximately 30 feet (north-south) by 20 feet (east-west) resulting in a total square footage of 600 square feet in Room 249 The main equipment of the incineration process is identified by number Line 33 is the ash removal glovebox system Line 37 is the sorting box and actual incinerator with the firebox for incineration and ash removal Line 38 is the ball mill for ash grinding Line 39 is the Nash Pump used to maintain negative pressure in the caustic scrubber of the system The process of incineration is explained in more detail in the following sections The incineration system can be divided into discrete portions for reference

- Filter Plenum,
- Ash Grinding (Line 38),
- Sorting Box and Incinerator (Line 37),
- Caustic Rotary Drum Filter (Line 33),
- Incineration Off-Gas System, and
- Nash Pump (Line 39),



ROOM 149 LAYOUT

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BUILDING 771 INCINERATOR
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FIGURE 3

2 1 2 Incinerator Equipment

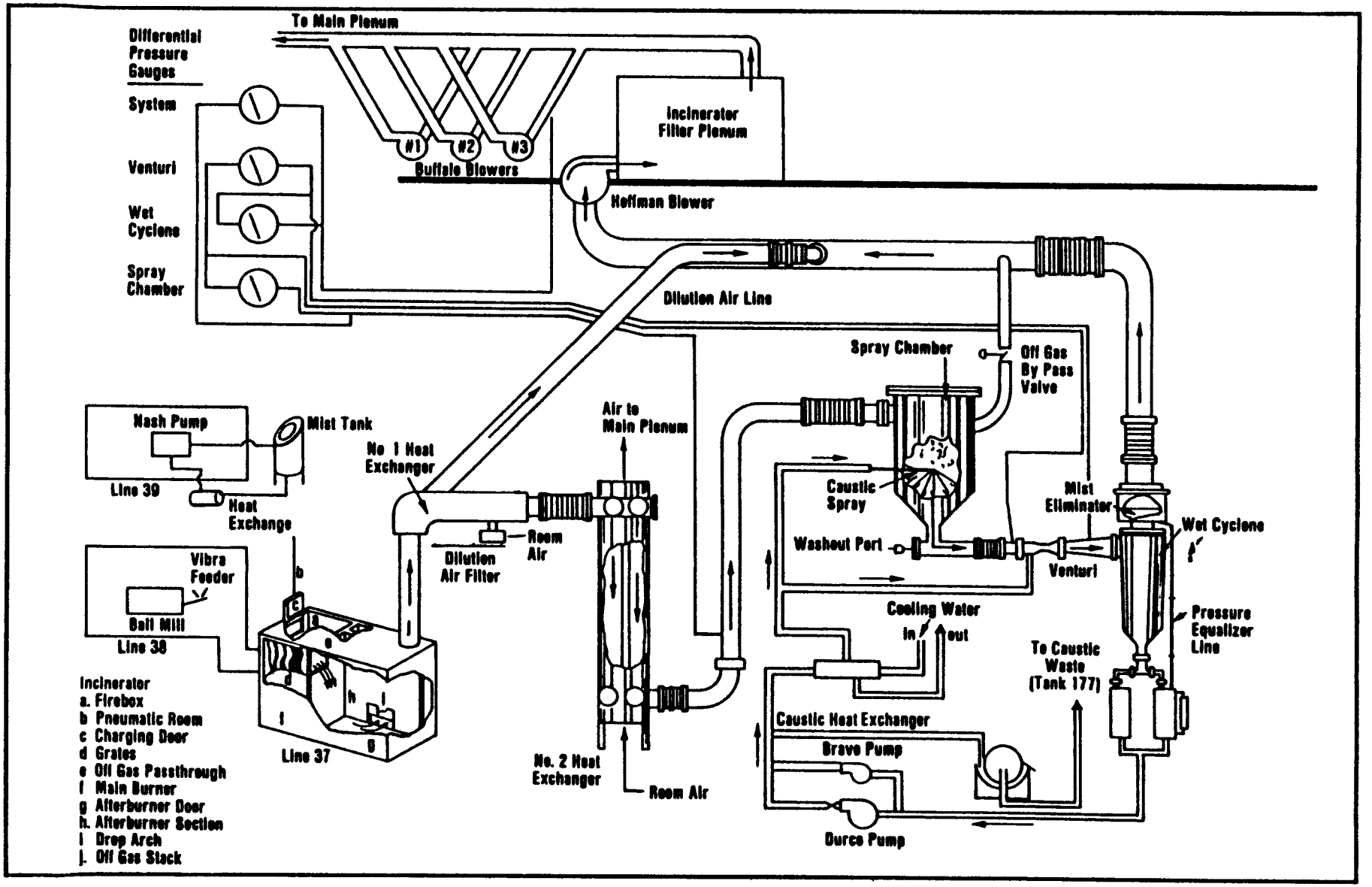
The incinerator, installed in 1959, consisted of a barrel dump station, a sorting box, a three chambered brick-lined firebox, a ceramic-lined breaching stack, and a dry off-gas system Because of plenum fires and corrosion, the dry off-gas system was replaced by the present wet scrubber system in 1968 The wet scrubber system consists of two air cooled heat exchangers, potassium hydroxide (KOH) caustic spray chamber, venturi, cyclone, and a rotary drum filter As the system operates, the cooled, neutralized gases pass through a four-stage High Efficiency Particulate Air (HEPA) filter plenum before entering the main Building 771 filter plenum The off-gases then pass through an additional two-stage HEPA filter plenum prior to discharge from the main Building 771 exhaust stack This exhaust stack is located to the east and slightly south of Building 771

The incinerator ash is processed in the glovebox adjacent to the incinerator, prior to storage and recovery. The ash, after cooling, is passed through a coarse sieve to remove non-ash materials such as glass and metal and then pulverized in a ball mill, containerized, and stored in an approved storage area for plutonium recovery Figure 4 is a schematic of the 771 Incinerator, pictures of the 771 Incinerator are included in Appendix A

2 2 Facility Operation

2 2 1 General

The purpose of the 771 Incinerator was the concentration of plutonium for recovery by reducing highly plutonium-contaminated solid combustibles to ash This ash was more suitable than the plutonium-contaminated materials for plutonium recovery The incinerator operated with no outside fuel source other than the feed materials themselves



INCINERATOR SYSTEM SCHEMATIC

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FIGURE 4

Oxygen was supplied to the incinerator from a storage tank The dimensions of the actual firebox are 4 feet long by 3 feet wide by 5 feet high, approximately 2 feet of this height is dedicated to the ash collection and cooling area

2 2 2 Periods of Operation

The 771 Incinerator operated from 1959 through April 7, 1989 During normal operation, the incinerator ran continuously (24 hours per day) until material build-up on the HEPA filters in the incinerator filter plenum was indicated by a pressure drop across the HEPA filters When this occurred, the incinerator was allowed to cool and the first stage of HEPA filters was changed A continuous run of the incinerator would last on the order of eight days The incinerator last operated on April 7, 1989 and will not be operated at any time in the future.

2 2 3 Maximum Inventory

The maximum residue inventory that will be present in the incinerator between now and the commencement of closure activities is essentially zero Visible residue materials have been removed from the incinerator sorting box, feed box, firebox and from the ball mill box These materials were removed by wiping down the gloveboxes and equipment with wipes dampened with water

The maximum residue inventory of the 771 Incinerator at any one time during operations was approximately 355 liters This quantity of residue consisted of approximately 313 liters of feed materials, approximately 20 liters of ash in the firebox, approximately 6 liters of ash in the ash pit, approximately 8 liters of ash in the ball mill and 8 liters of ash in the ball mill discharge area

2 2 4 Types of Waste Managed

The feed for the incinerator typically consisted of combustibles containing concentrations of plutonium Some quantities of non-hazardous, non-radioactive combustibles were also fed to the incinerator. These combustible materials were primarily paper towels, polyvinylchlonde (PVC) and polystyrene bags, polypropylene filters, latex surgical gloves, PVC maintenance tents, cardboard, and various types of sludge Table 1 identifies the approximate breakdown of residues fed to the incinerator. Some of the residues fed to the incinerator were potentially contaminated with hazardous constituents as defined by the Colorado Hazardous Waste Regulations Concentrations of hazardous waste fed into the incinerator, if any, are not known.

2.2.5 Residue Process Descnption

Residues were typically stored in 55-gallon drums prior to feeding to the 771 Incinerator The individual drums of residue destined for the incinerator were identified by the Nuclear Materials Control group based on plutonium content Residues entered the 771 Incinerator operation at the barrel dump station which is located at the north end of the Line 37 glovebox. The entire contents of the drum would enter the Line 37 glovebox through the barrel dump station The residues from the drum would be sorted and manually size-reduced within the sorting glovebox Sorting consisted of the removal of carbon, glass, metal, and used leaded glovebox gloves from the incinerator feed Either a knife or a pair of scissors was used for size reduction The combustible residues were then transferred to the area immediately adjacent to the firebox for feed to the incinerator

Combustible residues were manually fed to the incinerator firebox by the operator The objective during incinerator operation was to maintain a firebox temperature of approximately 850 degrees celsius (normal operating temperature range of 800 degrees to 900 degrees celsius) Typical feed rate for the incinerator was approximately 32 - 35

TABLE 1

INCINERATOR FEED BREAKDOWN

MATERIAL TYPE	APPROXIMATE PERCENT FEED	COMMENTS
Polyvinyl Chloride	45	
Polyethylene/Polypropylene	35	
Paper	5	
Liquids	5	H_2O, HNO_3[1]
Rubber Gloves	4	With Residues[2]
Filters With Carbon	3	Returns[3]
Metal	2	
Wood	1	
Total	100%	

1) Wet combustibles from process operations

2) Typically surgical gloves (not leaded) from process operations

3) Filters generated from Line 33 when vacuum filter drum is not operating are occasionally above EDL

NOTE The incinerator cannot handle bulk liquids or lead-lined gloves

pounds per hour Oxygen was introduced into the firebox to enhance combustion Incinerator ash fell through a grate located in the firebox, then was removed from the incinerator and was allowed to cool before being transferred to the adjacent glovebox for pulverization The resulting ash weighed 6% - 8% of the weight of the feed material, with approximately 50% of the ash weight consisting of silica and alumina from the clays used as filler material in paper and cardboard The ash was sieved to remove large materials, typically metals, and processed through a ball mill The pulverized ash was stored in 2- or 4-liter bottles awaiting dissolution and plutonium recovery

Off-gases from the incinerator firebox passed out of the firebox and entered an afterburner unit The afterburner unit consists of a chamber in which oxygen was introduced and particles detained so that combustion was completed The off-gases passed out of this afterburner and entered a second afterburner unit. Following the second afterburner, the off-gases passed through two non-contact air-to-air heat exchangers, a KOH spray chamber, a venturi, a cyclone for separation of the caustic from the gas, and a mist eliminator The caustic separated from the gas was either cooled in a non-contact water-cooled heat exchanger and recycled to the caustic spray chamber, or is passed through a vacuum drum filter and was sent to Building 774 for waste treatment The vacuum drum filter on the caustic scrubber system used diatomaceous earth as a filter aid and was a source of waste generation since the filter media was constantly removed during incinerator operation A second ful-flo filtering system was used to filter caustic solution when the vacuum drum filter was inoperative At times, these ful-flo filters qualified as residues and were used as feed for the incinerator The cooled neutralized gases passed through a four-stage HEPA filter plenum prior to entering the main Building 771 filter plenum where the gases passed through an additional two stages of HEPA filtration

2 2.6 Monitoring, Containment, and Safety Systems

A number of incinerator-dedicated monitoring, containment, and safety systems were built into the incinerator equipment These safety systems include separation (containment) of the incinerator processing activities from the general environment, gauges that monitor the pressure differential between various portions of the incinerator system, heat-sensing thermocouples, fire suppression systems, and a four-stage HEPA filter plenum

Separation of the incinerator system from the environment was accomplished by physical separation and containment The entire 771 Incinerator system, including gloveboxes dedicated to the incinerator and the off-gas system, is maintained at a negative pressure compared to the surrounding room.

Heat-sensing thermocouples are provided at a number of locations in the incinerator system The thermocouples are connected to the incinerator control panel and will sound alarms if overheat conditions are identified by the thermocouples Heat-sensing thermocouples are installed in the following areas· the firebox area, the first and second air-to-air heat exchangers; the breaching stack; the caustic spray chamber, the venturi unit, the Hoffman Blower, and before, in, and after the incinerator filter plenum An additional heat-sensing thermocouple is present in the by-pass line The by-pass line allows incinerator off-gases to vent directly into the incinerator plenum in the event of an upset in the vacuum balance, bypassing the caustic scrubber system

Fire-suppression systems are located in both the incinerator firebox area and the first and second stages of HEPA filtration. Fire-suppression nozzles in the incinerator firebox area are located in the sorting box, firebox charging door area and firebox ash pit area The water for this fire-suppression system comes from general plant water which is placed in a 37-liter stainless steel tank The tank is then pressurized to 20 psi with pressurized air When in use, the air pressure forces fire suppression water through fog-type nozzles

The final system to minimize release of materials from the 771 Incinerator is the four-stage HEPA filter plenum This HEPA filter plenum is the final point of containment that is dedicated solely to the incinerator The HEPA filter removal efficiencies are 99 9% in the first filter stage, 99 8% in the second filter stage, 99 8% in the third filter stage and 99 8% in the final filtration stage (Elder et al , 1986) Following this filtration, the off-gases are discharged to the main Building 771 filter plenum which contains a two-stage HEPA filter and filters air from the majority of Building 771

2 2 7 Releases

The entire 771 Incinerator system, including gloveboxes dedicated to the incinerator and the off-gas system, is maintained at a negative pressure compared to the surrounding room This negative pressure causes leaks in the incinerator system to result in leakage of room air into the incinerator system rather than leakage out of the incinerator system into the room The primary release from the incinerator is the release of off-gases which enter the environment from the main Building 771 stack

3.0 CLOSURE PLAN SUMMARY

3 1 Regulations and Requirements

Appropriate regulations pertaining to the closure of 771 Incinerator are identified on the Regulatory Checklist which begins on page iii of this document. All procedures and methods used in the closure process will adhere to applicable RFP procedures in addition to complying with State regulations

3 2 Closure Performance Standard

The objective of this closure plan is to meet the performance standards specified in 6 CCR 1007-3 Section 265.111. The standards require a facility be closed in a manner that·

- minimizes the need for further maintenance,
- controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface water or the atmosphere, and
- complies with the closure requirements

Therefore, the closure performance standard for all materials remaining in the area where the incinerator had been located will be as follows

- The direct radioactivity count will be equal to or less than 1000 disintegrations per minute (dpm) of total alpha activity per 100 cm^2 as measured with an air proportional alpha survey instrument

- The removable alpha activity will be equal to or less than 20 dpm per 100 cm^2, as measured from smears with filter paper counted on a scintillation instrument

- The final rinsate from decontamination of the area must be at background concentrations or lower for all compounds identified in Appendix VIII of 6 CCR 1007-3, Part 261 Background is defined as the mean plus three standard deviations of those contaminants found in the unused rinse solutions. Analysis for these will be conducted as required (EPA SW-846, 1986).

Materials removed from the above location will meet decontamination requirements identified in Section 5 4 or 5 5 of this plan or will be disposed of as a radioactive or mixed radioactive waste at an approved facility. Some material may require long-term on-site storage prior to off-site disposal due to the current lack of authorized disposal sites The material will be stored in appropriate storage locations.

3 3 Anticipated Closure Actions

Anticipated closure actions will be performed in a manner to achieve the objectives of the closure performance standards stated in Section 3 2 Subsequent to the approval of this closure plan, a work package that includes the engineering information as well as health and safety protection information will be developed This work package may consist of separate documents detailing specific aspects of this project Following completion of the work package, implementation of the closure plan will begin The following paragraphs

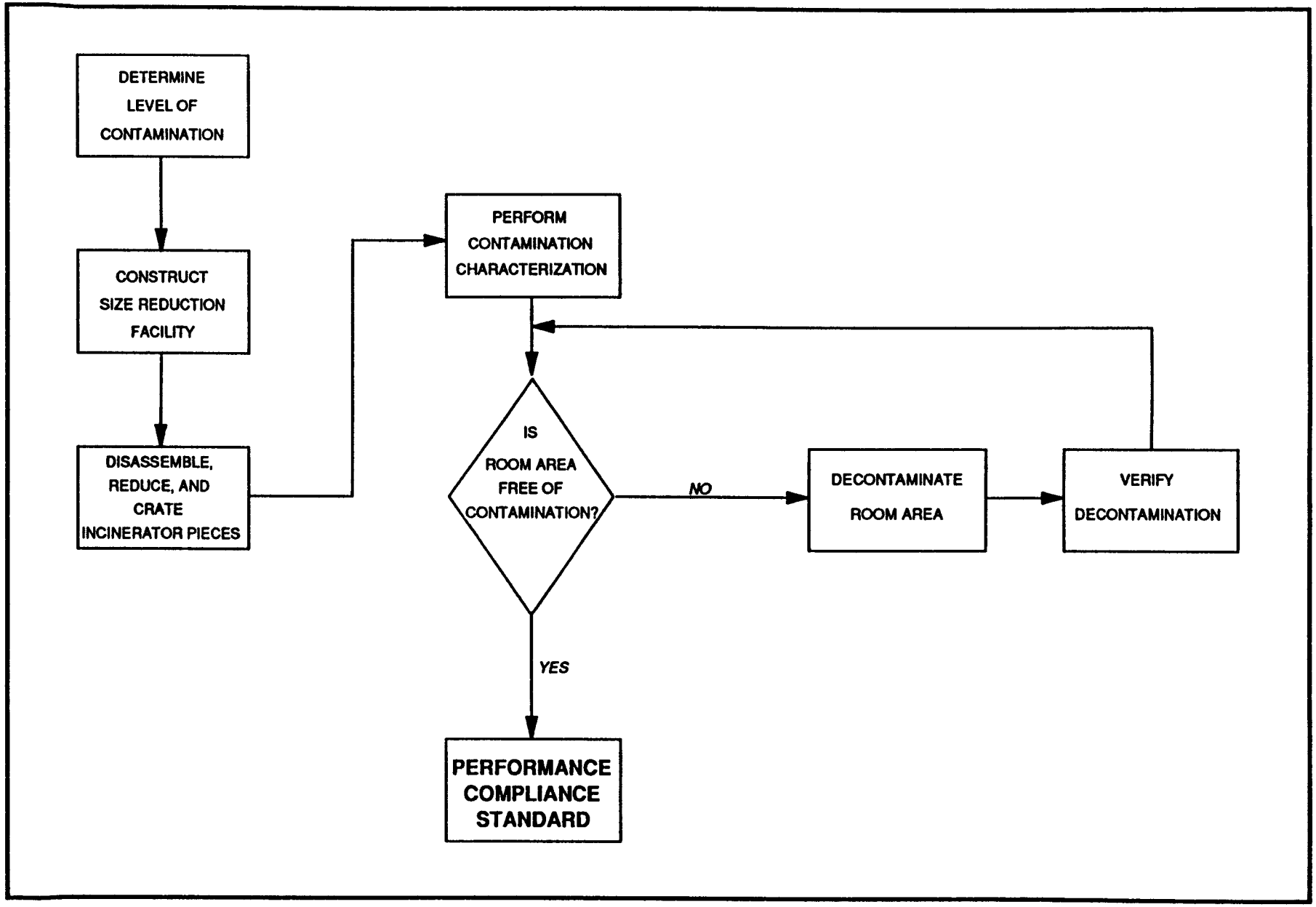
discuss the general procedures to successfully close the incinerator Figure 5 illustrates the closure plan activities

The primary step in the closure procedure is to test the interior of the firebox and ancillary equipment to determine the expected contamination level of the apparatus fated for disposal The expected contamination level will be determined by approved methods and qualified personnel.

Once the expected contamination level has been ascertained, the appropriate negative-pressure size-reduction facility will be fabricated to conform with the specifications outlined in the work package. The temporary structure will be made in such a way that it can be either decontaminated or reduced and disposed of with the bulk of the generated waste. All disassembly of the incinerator and ancillary equipment will be performed in the size-reduction facility. Section 5 of this plan presents additional details regarding the temporary size-reduction facility.

Sections of the incinerator and ancillary equipment will be disassembled from the unit and reduced in volume for placement in an appropriate disposal container Other segments will be containerized in an appropriate crate based upon the classification as determined in the first step The size-reduction chamber will be disassembled and decontaminated or reduced upon itself and containerized as waste.

The area of Room 149 left void will be decontaminated in the manner described in greater detail in Section 5 0 The void area will be sampled after decontamination, and will be decontaminated again if the concentrations are above the established levels. Once the levels of contamination in the area of the room left void are at acceptable levels and certification of closure is approved by the CDH, the closure of 771 Incinerator will be complete



CLOSURE PLAN ACTIVITY FLOW DIAGRAM

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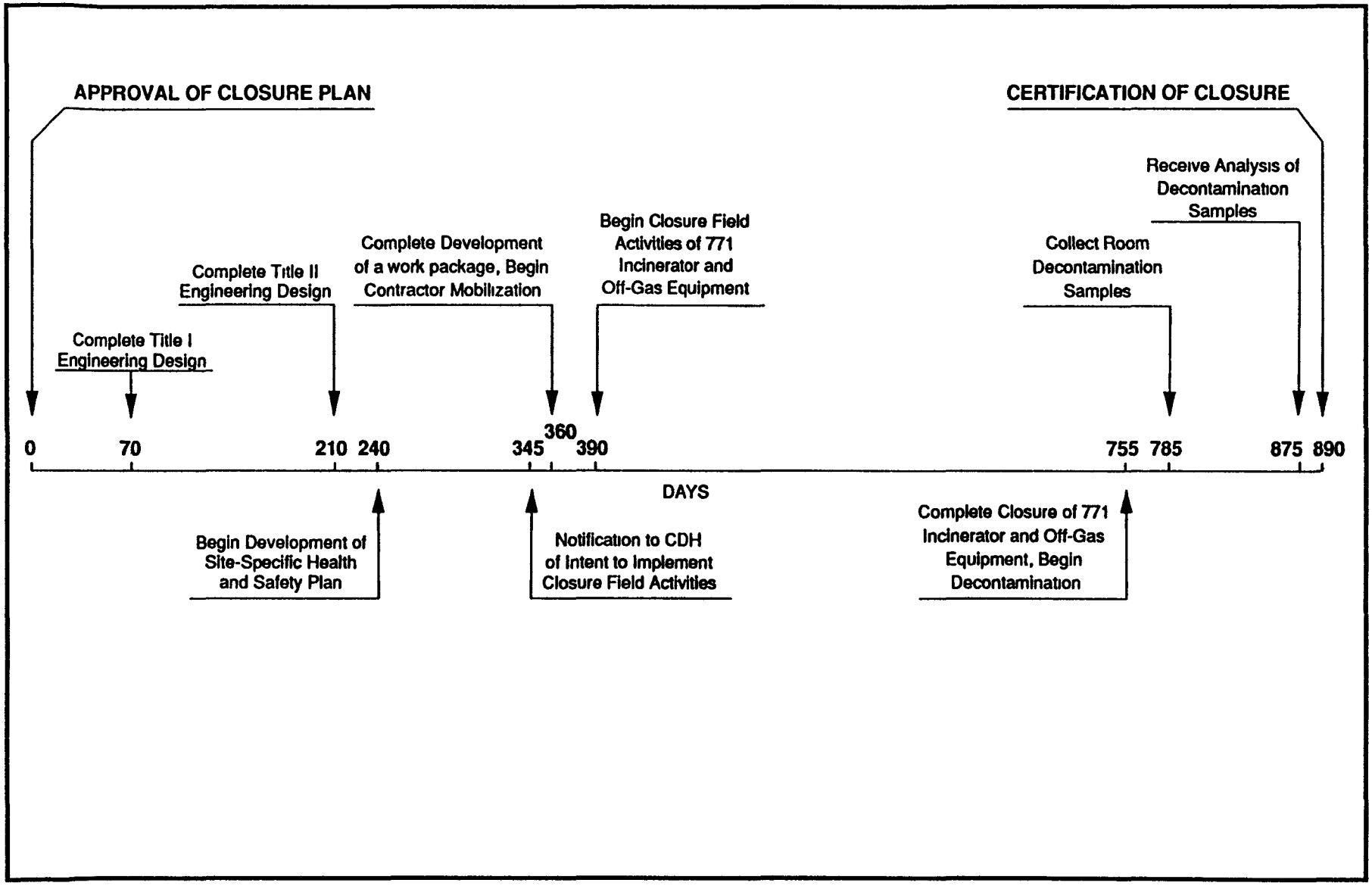
FIGURE 5

3 4 Closure Schedule

The closure schedule begins upon CDH approval of this closure plan At that time, preparation of the work package for closure of this incinerator will begin The first step required in preparation of the work package is the completion of engineering design work for stripout of the incinerator The engineering package will detail the exact sequence of activities, as well as exact methods of size reduction, to dismantle and containerize the incinerator for off-site disposal This engineering package, when complete, will be held on file at the RFP during implementation of incinerator closure and will always be available at the project site during execution of the program The level of engineering detail and approval for this project will be that normally associated with Title I and Title II design at the RFP Additional engineering resources will be available for field support for this project (Title III Engineering) Field engineering support will normally only be used when discrepancies between the detailed design package and field conditions or other problems are noted The removal time of the incinerator and ancillary equipment is estimated to require one year due to the volume of the apparatus destined for removal and the nature of contaminants

The CDH will be notified of the intent to close the incinerator 45 days prior to initiation of the closure field activities The final decontamination activities will require approximately 30 days An additional 90 days will be required to receive analytical results from sampling conducted during closure activities

Assuming the unit is shown to be sufficiently clean after one decontamination, closure will be certified approximately 890 days after closure plan approval Approval of this closure plan will include approval of this schedule for closure. If contamination is still present above the performance standards, the closure schedule will be further extended to allow additional time for further decontamination and analysis Figure 6 illustrates the anticipated closure schedule



CLOSURE ACTIVITY SCHEDULE

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FIGURE 6

Should the RFP determine that the closure plan requires modification for any reason prior to the implementation of the activities detailed in the plan, a written notice will be submitted to the CDH This notice will request the approval of the desired modification by the regulatory authorities The written notice and request will also be accompanied by a revised closure plan The RFP will revise the closure plan whenever changes in operating plans or facility design affect the closure plan In the unlikely event that problems arise during implementation of closure that prevent the clean closure of the incinerator area, the RFP will submit a revised closure plan as well as a Post-Closure Care Plan and a Post-Closure Care Permit Application for the unit The revised closure plan will be submitted to the CDH no later than 30 days after the unexpected event which has affected the closure plan The Post-Closure deliverables will be submitted to the CDH within 90 days of the date that the inability to complete clean closure is identified Additionally, the RFP will verbally notify the CDH of the inability to complete clean closure within seven days of the date that the inability to complete clean closure is identified The Post-Closure Care Plan and Permit Application will comply with the requirements of 6 CCR 1007-3, Part 265 117-265 120.

3 5 Administration of Closure Plan

The closure plan for the 771 Incinerator will be maintained at the Rocky Flats Office, Building 111, U S. Department of Energy The person responsible for storing and updating this copy of the closure plan is

Manager
DOE Rocky Flats Office
U S Department of Energy
Rocky Flats Plant
P O Box 928
Golden, Colorado 80402
Phone (303) 966-2025

Copies of this plan will also be available at various other locations such as the Rocky Flat Reading Room, the Rocky Flats Environmental Monitoring Council, and the CDH

4 0 REMOVAL AND MANAGEMENT OF RESIDUE INVENTORY

The incinerator last operated April 7, 1989 There is no feed within the incinerator gloveboxes awaiting combustion, nor are there plans to operate the unit in the future Inventories of plutonium were performed in June 1989 and December 1989 During inventory procedures, the interior portions of the incinerator firebox and gloveboxes had all visible dust and other residues removed With the exception of currently inaccessible ash residues, there is no remaining residue inventory within the incinerator gloveboxes that would require removal or management Small quantities of ash residues may be found in and under the firebox and in the first and second air-to-air heat exchangers All residues found during dismantling activities will be containerized and managed according to the appropriate RFP procedures for residues

5.0 DECONTAMINATION AND DECOMMISSIONING

5 1 General

Decontamination and decommissioning of the 771 Incinerator will consist of dismantling the incinerator and all sub-systems expressly dedicated to the incinerator This equipment will be size-reduced to allow for packaging necessary to meet off-site disposal requirements as either a low-level or TRU radioactive waste In either case, the waste may qualify as a mixed waste After certification of closure, the area in which the 771 Incinerator is now located will be used for new operations

5 2 Dismantling of Unit

5.2.1 Limits of Unit

The limits of the incinerator unit to be dismantled will generally be determined based upon the last portion of the system that is dedicated solely to the incinerator If equipment from operations or processes other than the incinerator are present, then that equipment will not be dismantled Therefore, the limits of the unit can be defined as:

- All of Line 33, 37, and 38 gloveboxes,
- All of the incinerator caustic waste system to valve HV-1119 at tank 922 (tank 922 accepts waste materials from processes other than the incinerator);
- All of the incinerator off-gas system to the connection with the main filter plenum (this connection is in Room 249),

- All blowers and pumps associated with the incinerator residue or off-gas system, and

- The incinerator filter plenum

Line 39 and the Nash vacuum pump will not be dismantled as part of the 771 Incinerator closure This system, although currently dedicated to the filter drum for caustic waste from the incinerator off-gas system, will be reused for other Building 771 activities

5 2.2 Anticipated Activities

The basic approach for dismantling and removal of the 771 Incinerator will be to construct a temporary sealed area (airlock) in Rooms 149 and 249 of Building 771 in which size reduction and waste packaging activities can be conducted. This facility will be referred to as the temporary size-reduction facility The temporary size-reduction facility is necessary to minimize the possibility of causing general radioactive or hazardous constituent contamination of Rooms 149 or 249 Materials to be size-reduced will be moved into the size-reduction facility and size-reduced to the extent necessary to allow appropriate packaging. The temporary size-reduction facility will probably be constructed of a fire-retardant material in order to allow the safe use of welding and mechanical cutting equipment which will generate sparks and heated materials. Waste materials will be packaged into suitable containers for off-site disposal. Containers used for off-site disposal will be appropriate for the anticipated levels of radioactive contamination associated with the materials generated Strippable decontamination coatings and fixing agents may be utilized on the floor, walls, and ceiling of the temporary size-reduction facility for contamination control

To the extent possible, equipment to be size-reduced and packaged will be decontaminated to the radioactive low-level waste category prior to size-reduction

Decontamination will lessen contamination-control problems and increase worker safety In general, decontamination of equipment will be done using wipes wetted with decontamination (chelating) agents or with a steam-type decontamination unit Contamination remaining on any equipment will be fixed with suitable coatings, such as paint, prior to size reduction and packaging activities for contamination control

Size reduction and packaging activities will be conducted first on gloveboxes, process piping, and equipment directly related to incinerator operation, and then proceed to utilities and fire protection systems that had been related to the incinerator Size reduction will be conducted as necessary to allow packaging of materials for disposal as a waste. For instance, the floor, walls, and ceiling of a glovebox will be cut and carefully packed into waste crates in such a manner as to maximize the amount of waste in any waste crate. Cutting operations will be conducted by conventional welding and size-reduction equipment (plasma arc cutting equipment and electric saws) Materials known or expected to qualify as a mixed hazardous and radioactive waste will be separated from other materials and packed with other, similar, waste materials. For instance, lead shielding on the outside of a glovebox that cannot be removed and separately packed will cause the glovebox removal waste to qualify as a mixed low-level or mixed TRU waste

Once all equipment directly or indirectly related to the incinerator has been removed, general decontamination of room structural surfaces will be performed, decontamination will be verified, and the area will be released for new use General room decontamination is discussed in Section 5 3 of this plan Decontamination verification (closure performance standard) is discussed in Section 3 2 of this plan

It is anticipated that the majority of size reduction and packaging activities will require the use of supplied air breathing equipment for worker health and safety The use of supplied air will significantly reduce worker efficiency to approximately 30% - 50% (2 4 to 4 available work hours per day)

The sequence of equipment removal will be planned for a general floor space clearing, allowing for easier materials movement When warranted, dismantling and other closure activities may be performed concurrently, depending upon the available work space, working crew size and makeup, logistics, schedule and budget influences, and other considerations.

The temporary size-reduction facility will operate as a waste generation and storage area, in compliance with regulatory requirements for such an area This storage area will only be active during implementation of 771 Incinerator closure activities Prior to placement in a waste container, materials will be considered "in process," and will therefore not yet qualify as a waste. Once waste materials are removed from the temporary size-reduction facility, they will be managed in RCRA waste storage areas at the RFP while awaiting off-site disposal During this storage period, all applicable monitoring and inspection requirements will be met as identified in the Standard Operating Procedures

During all closure field activities the project manager present will maintain a detailed record of all activities. The project manager will sign this record at the end of each day This record will include notations regarding decontamination activities, size-reduction activities, waste packaging activities, materials handled, and any problems encountered The identification numbers of waste containers used on each day, along with quantities of waste generated, will be logged in this record The record will also identify the personnel present and the specific tasks each person is assigned The intent of this detailed record is to generate an inspectable record for the use of the independent, registered professional engineer, as well as for any CDH inspections

5 2 3 Work Packages

The work related to the closure of 771 Incinerator will require the preparation of a Site-Specific Health and Safety Plan which will be prepared in accordance with the EG&G

Environmental Restoration Health and Safety Program Plan. The Site-Specific Health and Safety Plan will trigger the need for the issuance and approval of a work package that will include requirements identified by the EG&G Health and Safety Practices (HSP) Manual Section 6.05 of the HSP Manual further details the current requirements of this work package. The intent of the work package is to ensure that hazards associated with any job or task are identified and adequate steps taken to eliminate, nullify, or reduce to a minimum the consequences of such hazards Therefore, the requirements of the work package will require that the disciplines/groups at the RFP with jurisdiction over the various work tasks and safety issues approve the procedures and activities to be implemented. Health and safety procedures must be approved prior to the start of any field activities.

The health and safety procedures and documentation at the RFP are changing rapidly and names of particular packages and requirements may be different when this closure plan is implemented. Although the names and nomenclature may change, at a minimum, the intent and requirements of health and safety procedures identified in this closure plan will be met The RFP closure project manager will verify that the intent of the requirements identified in this closure plan are met and that requirements of the HSP Manual or its replacement will be met. The RFP closure project manager will also document differences in terminology and nomenclature between this closure plan and procedures used in its implementation

5 2 4 Determination of Status of Materials Generated

The 771 Incinerator processed plutonium contaminated residues Some of the materials processed by the incinerator may have qualified as mixed residues Low-level radioactive waste is contaminated with less than or equal to 100 nanocuries per gram of TRU compounds Transuranic radioactive waste is contaminated with greater than 100 nanocuries per gram of TRU compounds. TRU compounds are those compounds with

an atomic number greater than uranium When a radioactive waste also qualifies as a hazardous waste, the resultant waste mixture is considered a mixed waste

As previously discussed, equipment to be size-reduced will be decontaminated to the extent possible prior to size reduction. The regulatory status of dismantled equipment (waste) with respect to the hazardous waste regulations will be determined based upon the analysis of decontamination rinse solutions or wipes for Appendix VIII constituents as identified in 6 CCR 1007-3, Part 261 The waste will be considered clean if the used rinse solution or wipes are equal to or less than the mean plus three standard deviations of those Appendix VIII constituents identified in the unused rinse solutions or wipes If this analysis indicates the presence of hazardous constituents the waste will be disposed as a hazardous or a mixed radioactive waste Similarly, any equipment that is potentially a characteristic hazardous waste will be analyzed in accordance with 6 CCR 1007-3, Part 261 requirements. This waste will be managed properly based upon the results of that analysis. Analyses for the determination of the hazardous waste regulatory status will be in accordance with requirements (EPA SW-846, 1986). Any equipment that is not analyzed will be considered a mixed radioactive waste and managed appropriately Used decontamination rinse solutions and wipes will be managed as either radioactive or mixed radioactive wastes depending upon the results of the above analyses

While dismantling the 771 Incinerator the best professional judgment will be used to guide packaging of the waste materials as either a low-level or TRU waste This judgment will be made based on the results of hand-held radiological monitoring equipment The containers of waste, when moved out of the temporary size-reduction facility, and prior to long-term storage at any site, will be non-destructively assayed for radioactive content (counted) Counting of drums will be conducted in the Building 771C (Building 771 Annex) drum counter or another PSZ drum counter Crates, whether low-level or TRU, will be counted in Building 569 Counting of drums and crates will be the point at which final determination of radioactive waste classification is made Every effort will be made

to package materials in the temporary size-reduction facility as appropriate for the levels of radioactive contamination present, but repackaging of some materials may be necessary. This repackaging would only be required when materials packaged as low-level radioactive waste or mixed low-level radioactive waste are identified as TRU radioactive waste or mixed TRU radioactive waste

5.2.5 Disposal of Waste Materials

Waste materials will be disposed at either the Nevada Test Site (NTS) in the State of Nevada or the Waste Isolation Pilot Project (WIPP) in the State of New Mexico. All low-level radioactive and mixed low-level radioactive waste will be disposed of at the NTS. All TRU radioactive and mixed TRU radioactive waste will be disposed of at WIPP NTS is currently accepting strictly low-level radioactive wastes and is awaiting general approval to accept mixed low-level radioactive waste The WIPP facility is awaiting general approval to accept wastes. Until these waste materials are shipped offsite, storage at the RFP will comply with applicable regulatory and health and safety requirements

5 3 Decontamination of Incinerator Location

Following the removal of the incinerator and ancillary equipment from Room 149, the surfaces where the incinerator and ancillary equipment stood will be cleaned by hand washing or steam cleaning The portion of the room affected by the incinerator and ancillary equipment will be cordoned off with a temporary berm constructed of plastic-wrapped wood sealed to the existing floor. A single wash/rinse cycle will be conducted with a decontamination solution suitable for the removal of low-level contaminants potentially remaining in the area The cleaning, wash, and rinse solutions will be collected by a vacuum unit following decontamination efforts and sampled Decontamination will be considered complete when the closure performance standard is met If the closure performance standard is not met, the wash/rinse activities will be

repeated Should it prove impossible to meet the closure performance standard, the requirements of Section 9 0 of this plan will be implemented.

5 4 Management of Auxiliary Equipment

Auxiliary equipment for the 771 Incinerator consists of carts and drum dollies used to transport feed materials to the incinerator, and carts used to transport ash generated by the incinerator to counters and long-term storage areas prior to plutonium recovery Carts and dollies were not specifically dedicated to the incinerator, so all carts and dollies in Building 771 will be checked for compliance with the radioactive closure performance standards defined in Section 3 2 of this document Should any auxiliary equipment not meet the radioactive closure performance standard, the equipment will be size-reduced in the temporary size-reduction facility and disposed offsite Equipment remaining in Building 771 that serviced both the incinerator and other operations (such as the main plenum), will be managed in accordance with all applicable requirements when replaced or when Building 771 is decommissioned

5 5 Decontamination of the Equipment Used During Closure

Upon completion of dismantling operations related to closure, equipment used during closure will be either disposed of as a waste or decontaminated in the temporary size-reduction facility prior to other use Should decontamination of any of this equipment to the levels specified in Section 3 2 of this report prove impossible, the equipment will be disposed of as a waste

Plastic sheets used in the decontamination area and all other disposable contaminated equipment accumulated during closure will be containerized and shipped to an authorized off-site disposal facility

6.0 HEALTH AND SAFETY REQUIREMENTS

Following preparation of the detailed engineering package, a Site-Specific Health and Safety Plan will be prepared This plan will be prepared according to the EG&G Environmental Restoration Health and Safety Program Plan which provides general guidance for the preparation of Site-Specific Health and Safety Plans. The Site-Specific Health and Safety Plan will trigger the need for the issuance of a work package that includes requirements as identified by the EG&G HSP Manual

The work package will identify, address, and comply with all Occupational Safety and Health Administration (OSHA), CDH, and DOE requirements as well as all applicable requirements of the Health and Safety Program (HSP) Plan for the RFP Sections 6 05 and 2.11 of the HSP Manual describe the current health and safety requirements that would be addressed in this work package in greater detail. The approved work package will be distributed and reviewed by individuals involved in these closure actions Copies of the work package will be available at the closure work site during closure activities for review by workers. All workers involved in closure (stripout) of the incinerator will be OSHA health and safety trained in compliance with 29 CFR 1910 120

A specific Health and Safety Plan (HASP) will be developed in detail as a fundamental part of the work package The HASP will be generated in a manner that conforms with the requirements of the HSP Manual and will be approved by the EG&G Health and Safety (H&S) Group and the Industrial and Safety Systems Engineering (I&SSE) Group prior to the acceptance of the work package Included in the HASP will be methods of monitoring, requirements of recordkeeping and documentation, description of acute exposure symptoms for predicted chemical hazards, required personal protective equipment, personnel training requirements, medical monitoring requirements, a list of anticipated project personnel, methods of site entry, methods of decontamination, and

emergency information. The health and safety information in the work package will be actively used throughout the closure procedures.

7.0 SITE SECURITY

Access to the work area will be limited to authorized personnel only Exit from the working area will be through a clean, restricted area in the decontamination area Existing security measures at the RFP meet the requirements of 6 CCR 1007-3, Section 265 14 The processing areas of Building 771 (such as Room 149) are all non-smoking areas and are posted as such at all entrances. The area of Rooms 149 and 249, in which incinerator closure activities will take place, will have security signs stating "Danger-Unauthonzed Personnel Keep Out" posted at all entrances Additional security measures for the RFP include·

- A three-strand barbed-wire cattle fence surrounding the facility posted to identify the land as a government reservation/restricted area;

- A fence and armed guards posted 24 hours per day at two gates to the controlled area of the facility, and

- Surveillance by security cameras 24 hours per day

Existing fences and gates are operated and maintained by RFP Maintenance requirements will be performed by RFP regardless of closure activities at the site

8.0 CLOSURE COST ESTIMATE AND FINANCIAL ASSURANCE

As specified in 6 CCR 1007-3, Section 266.10(c), the Federal government is exempt from the financial requirements imposed by 6 CCR 1007-3, Section 266 12. Because the RFP is a federally-owned facility, no cost estimate or financial assurance documentation for closure is required Cost estimates are presented in Table 2 for planning, budgeting, and general informational purposes These estimates can in no way be considered binding

The dismantling cost estimate presented below is based on similar dismantling activities that were implemented in Building 371 of the RFP in 1987/1989. The dismantling cost has been adjusted for major changes in RFP procedures Similarly, the estimates are also based on other current costs such as time, disposal, and shipping costs Engineering time in this cost estimate is based on the current RFP engineering rate and was assumed to be completed by an off-site contractor with RFP engineering oversight. Current disposal costs at the NTS are $270 per cubic yard of strictly low-level radioactive waste and $945 per cubic yard of mixed low-level radioactive waste. Shipping costs to the NTS are approximately $185 per cubic yard. It is currently believed that WIPP will not charge for the disposal of defense-related wastes; however, shipping charges to WIPP of $243 per cubic yard must be paid. Disposal and shipping costs were estimated based on disposal as a mixed low-level radioactive waste at the NTS, because disposal and shipping costs are maximized in this manner.

TABLE 2

PRELIMINARY COST ESTIMATE FOR CLOSURE OF 771 INCINERATOR

Engineering Design and Inspection	
Title I	$ 239,000
Title II	476,100
Title III	282,500
Equipment	308,700
Site-Specific Health & Safety Plan and Work Package Development	12,100
Radiation Monitoring/Decontamination Monitoring	220,500
Dismantling Activities	1,523,300
Sampling and Analysis	99,200
Transportation	11,700
Disposal	59,600
Contingency	485,800
TOTAL	$3,718,500

9.0 POST-CLOSURE CARE AND MONITORING

The implementation of post-closure monitoring is unnecessary because the incinerator and ancillary equipment will be removed from the area and the room decontaminated to safe levels In the unlikely event that problems arise during implementation of closure that prevent the clean closure of the incinerator area, the RFP will submit a revised closure plan, as well as a Post-Closure Care Plan and a Post-Closure Care Permit Application for the unit The revised closure plan will be submitted to the CDH no later than 30 days after the unexpected event which has affected the closure plan The Post-Closure deliverables will be submitted to the CDH within 90 days of the date that the inability to complete clean closure is identified Additionally, the RFP will orally notify the CDH of these developments within seven days of the date that the inability to complete clean closure is identified. The Post-Closure Care Plan and Permit Application will comply with the requirements of 6 CCR 1007-3, Part 265 117-265 120

10.0 CLOSURE CERTIFICATION

10 1 Certification Requirements

Within 60 days of completion of closure, the owner or operator and an independent registered professional engineer will submit certification of closure to the CDH The affidavit will certify that the 771 Incinerator has been closed in accordance with the requirements in the approved closure plan

The independent registered professional engineer will periodically review the closure operations in detail to allow certification of closure. The final certification of closure will state that the closure procedures and standards have been carried out as described in the approved closure plan. In order to certify the performance and completion of closure activities, the independent registered professional engineer will review test results and inspect the site to verify the closure plan was carried out as approved Certification by a registered professional engineer does not guarantee the adequacy of the closure procedures and does not necessarily involve detailed testing and analyses

10 2 Activities Requiring Inspection by a Registered Professional Engineer

An independent registered professional engineer will inspect sampling and decontamination activities for certification of closure A Federally-issued Q-clearance level will enable the independent registered professional engineer to be onsite at all times as well as make unannounced inspections of the closure activities The selected engineer will be supplied with his own copy of the approved closure plan, and he will familiarize himself with the requirements of the approved closure plan In addition, the engineer will be fully trained in building procedures as well as fully trained in safety procedures for radioactive and mixed waste handling

Specific activities the independent registered professional engineer will inspect and certify include, but are not limited to, the following

- Initial survey of the room and materials to be removed by the closure of the incinerator,

- Construction of the temporary size-reduction facility,

- Dismantling of the following discrete portions of the incinerator:
    1. Filter Plenum;
    2. Ash Grinding (Line 38);
    3. Incinerator (Line 37),
    4. Caustic Rotary Drum Filter (Line 33),
    5. Incinerator Off-Gas System;

- Dismantling of the temporary size-reduction facility,

- Decontamination of the room;

- Decontamination of the auxiliary equipment; and

- Inspection of the container-counting facilities and storage facilities.

It is anticipated that the engineer will be present for at least a week for the dismantling of each of the identified discrete portions of the system. In this manner, the engineer will be present for a minimum of 25% of the closure field activities In addition to the above inspections, he will also review the logbook of closure activities for compliance with the requirements of the approved closure plan

11.0 REFERENCES

EG&G Rocky Flats, Inc , 1990, Health and Safety Practices, Health and Safety Support Systems, July.

Elder, J. C. et al., 1986, A Guide to Radiological Accident Considerations for Siting and Design of DOE Non-Reactor Nuclear Facilities, LA-10294-MS, U-41, Los Alamos National Laboratory, Los Alamos, New Mexico, January

EPA SW-846, 1986, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, November, as amended and updated.

12.0 GLOSSARY

The following is a brief glossary of terms used in this report. The definitions given should only be considered valid for this specific report.

AFTERBURNER: A chamber that is part of the 771 Incinerator off-gas system. This chamber provided an opportunity for partially burned entrained materials to fully burn

ALPHA PARTICLES: Ionizing radiation consisting of a helium nucleus

ANCILLARY EQUIPMENT: Equipment that is physically connected to the 771 Incinerator and was dedicated to the incinerator operations

AUXILIARY EQUIPMENT: Equipment used for 771 Incinerator operations that was not connected to the incinerator This equipment may have been, but was not necessarily dedicated to incinerator operations.

BETA PARTICLES: Ionizing radiation that consists of an electron

CAUSTIC: Term referencing potassium hydroxide (KOH) which was used to neutralize and scrub incinerator off-gases

CHELATING AGENTS: Compounds that will attach to other compounds with more than one bond, thereby forming a ring structure

CONTAMINATION LEVEL: The level of radioactive contamination of the incinerator equipment to be dismantled in Building 771 Contamination levels will be used to determine the required level of health and safety protection as well as to guide the packaging of dismantled equipment

COUNTING: The measuring of the radioactive content of a material The final determination of the regulatory status of radioactive materials will be made at the counting step. Counting in this report is similar to the non-destructive assay of materials

CURIES: The unit of measurement for radioactivity, with one curie equalling 3 7 x 10^{10} disintegrations per second

DOE (DEPARTMENT OF ENERGY):

The United States Department of Energy, the owner of the Rocky Flats Plant

EDL (ECONOMIC DISCARD LIMIT):

The level of activity associated with a material below which the material is considered a waste. When the activity of a material exceeds the EDL, the material is considered a residue.

EG&G: EG&G Rocky Flats, Inc., the Rocky Flats Plant operating contractor

FIREBOX: The portion of the 771 Incinerator in which direct combustion of feed materials formerly took place The dimensions of the firebox are 3 feet wide by 4 feet long by 5 feet high.

FUL-FLO FILTERS: Cartridge filters, made of various materials, that are used to filter liquid solutions. Normally these filters separate suspended radioactive materials from the liquid materials

GAMMA RAY: Highly penetrating ionizing radiation consisting of electromagnetic wave energy.

GLOVEBOX: The primary device used for the containment of radioactive materials. Gloveboxes have a negative pressure compared to the surrounding room, and are provided with gloves to allow for the manipulation of materials within the glovebox Gloveboxes are primarily constructed of sheet stainless steel

HALF-LIFE: The average time required for one half the atoms in a sample of a radioactive compound to decay.

HEPA (HIGH EFFICIENCY PARTICULATE AIR) FILTERS:

The filters used to remove particulate matter from air streams at the Rocky Flats Plant

H&S (HEALTH AND SAFETY) GROUP:

A Rocky Flats Group with primary requirements to review activities and procedures to provide for safe operations

IONIZING RADIATION: Radiation that is capable of electrically charging, either positively or negatively, other neutral atoms Ionizing radiation typically consists of either alpha particles, beta particles, or gamma rays

I&SSE (INDUSTRIAL AND SAFETY SYSTEMS ENGINEERING):

A Rocky Flats Group with requirements to review activities and procedures to provide for safe operations

KOH: The chemical formula for potassium hydroxide KOH is also referred to in this document as caustic

MIXED RESIDUES: Residues that are mixed with hazardous wastes as defined by the Colorado Hazardous Waste Regulations

MIXED WASTE: A waste that contains both radioactive and hazardous waste materials. As used in this document, such a waste may be either a mixed low-level waste or a mixed TRU waste.

NANOCURIE: One billionth, or 10^{-9}, of a curie of radioactivity

NTS (NEVADA TEST SITE):

The final disposal site for DOE low-level radioactive waste and mixed low-level radioactive waste. This site is located near Mercury, Nevada.

OFF-GAS: The gases that were produced by the 771 Incinerator when in operation. These off-gases were processed through a number of control units prior to release to the atmosphere.

OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION):

The United States regulatory body with the primary charter of regulating work conditions to provide for the safety of workers in the United States.

PLENUM: An enclosure for the conveyance of gases.

PSZ (PERIMETER SECURED ZONE):

A highly restricted area at the Rocky Flats Plant in which only Q-Cleared personnel are normally permitted. Building 771 is located in the PSZ.

Q-CLEARANCE: A high level of security clearance granted by the DOE.

RADIOACTIVITY: A material or element capable of spontaneously giving off ionizing radiation. Each such release of ionizing radiation is normally considered a disintegration.

RESIDUE: These are one of the by-products of plutonium production processes which are specifically defined as containing concentrations of plutonium above the EDL established by the DOE.

SCINTILLATION COUNTER:

An instrument for measuring radioactivity by the counting of flashes of light produced by ionizing radiation upon striking a crystal or phosphorescent material.

SSHSP (SITE-SPECIFIC HEALTH AND SAFETY PLAN):

An overall health and safety plan prepared for each site-specific activity in which the EG&G ER program is involved The SSHSP will identify the need for other health and safety plans or requirements

THERMOCOUPLES: A temperature measuring device installed in 771 Incinerator equipment.

TRU (TRANSURANIC) COMPOUNDS:

Those compounds that have an atomic number greater than 92, the atomic number of uranium

TRU WASTE: Radioactive waste materials containing alpha particle-emitting TRU compounds with half-lives greater than 20 years, in concentrations greater than 100 nanocuries per gram of materials.

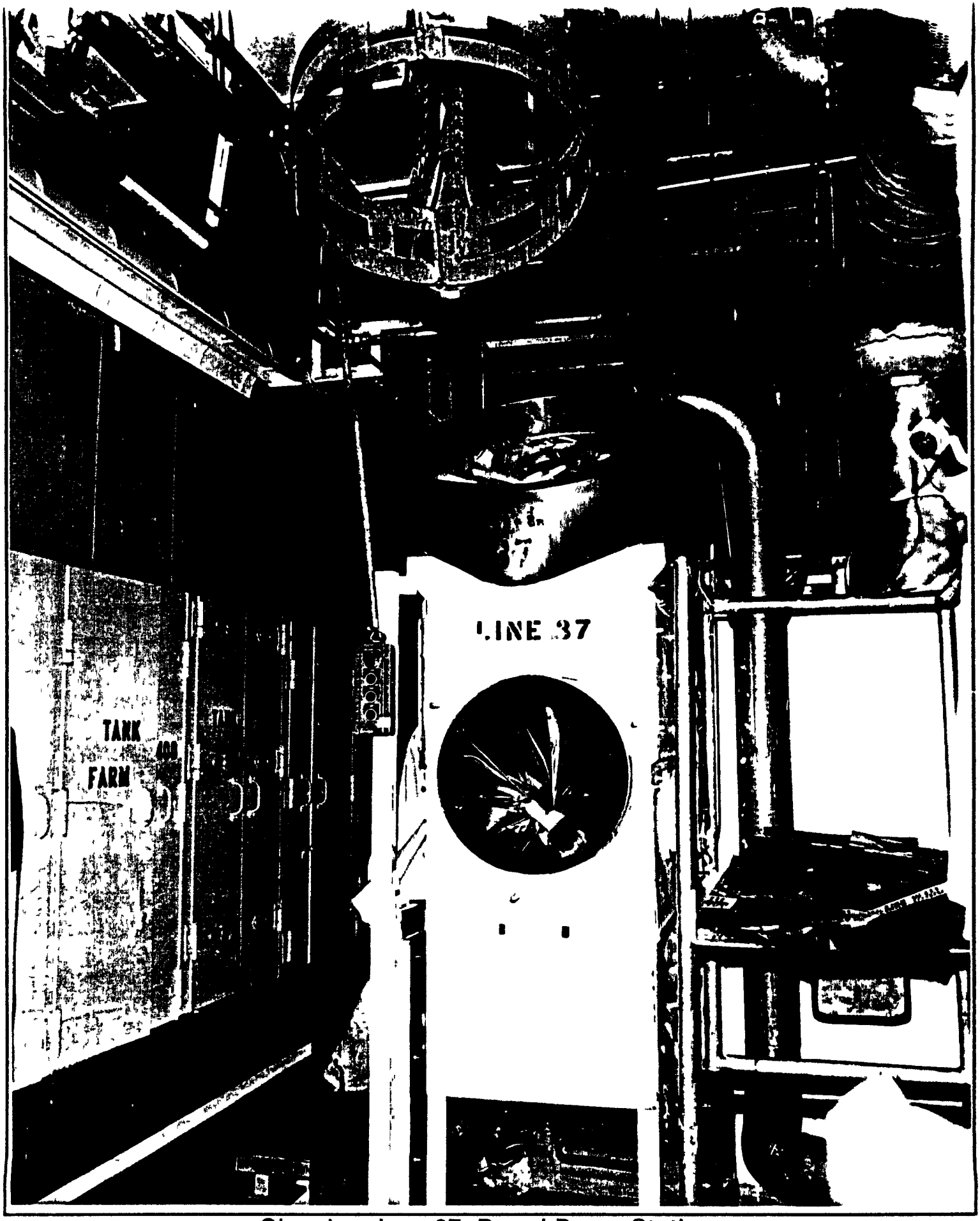
VENTURI: A constricted, throat-like passage used to increase the speed and lower the pressure of a material passing through it

WIPP (WASTE ISOLATION PILOT PROJECT):

The final disposal site for DOE TRU waste and mixed TRU waste This site is located near Carlsbad, New Mexico

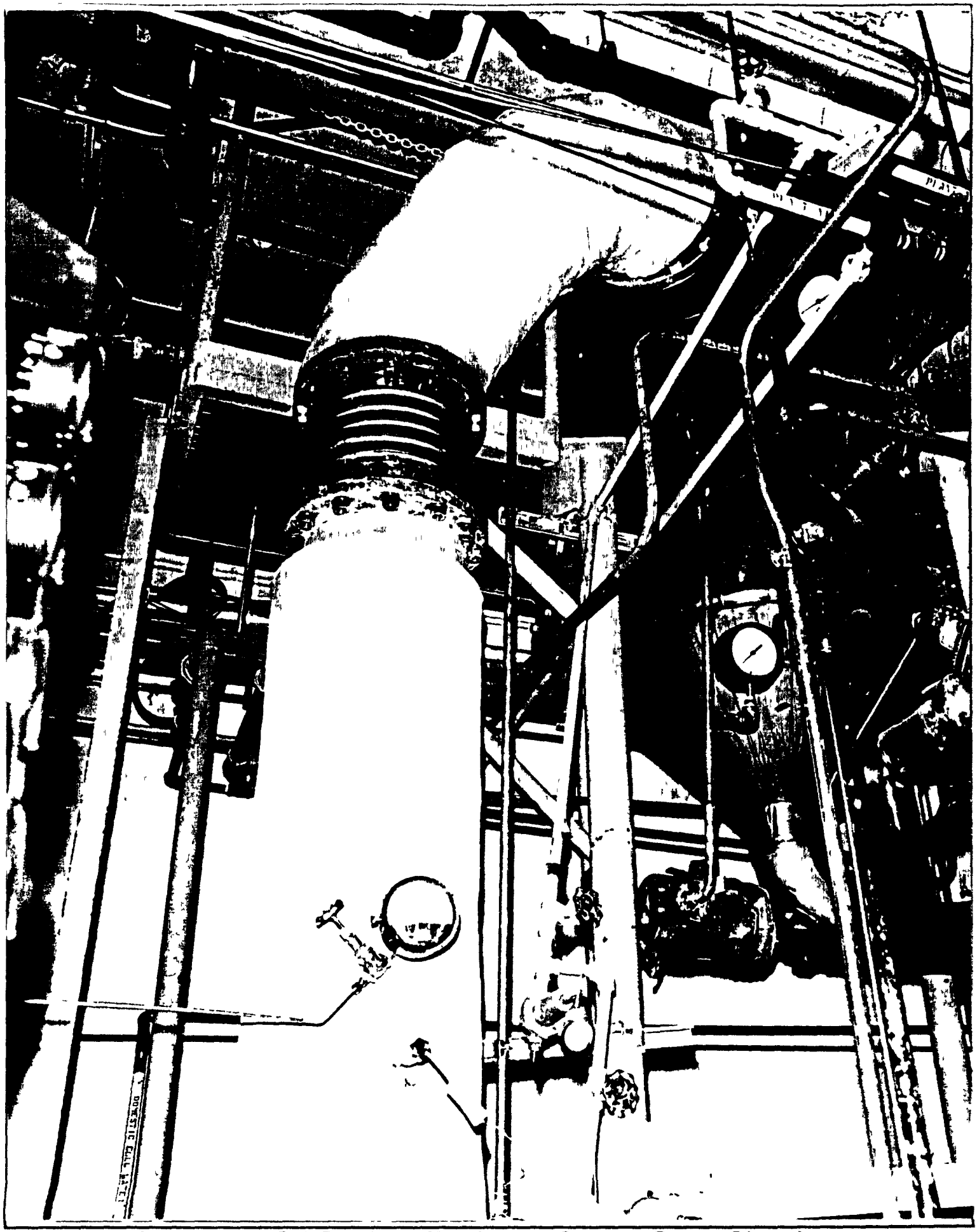
APPENDIX A

SITE PHOTOGRAPHS

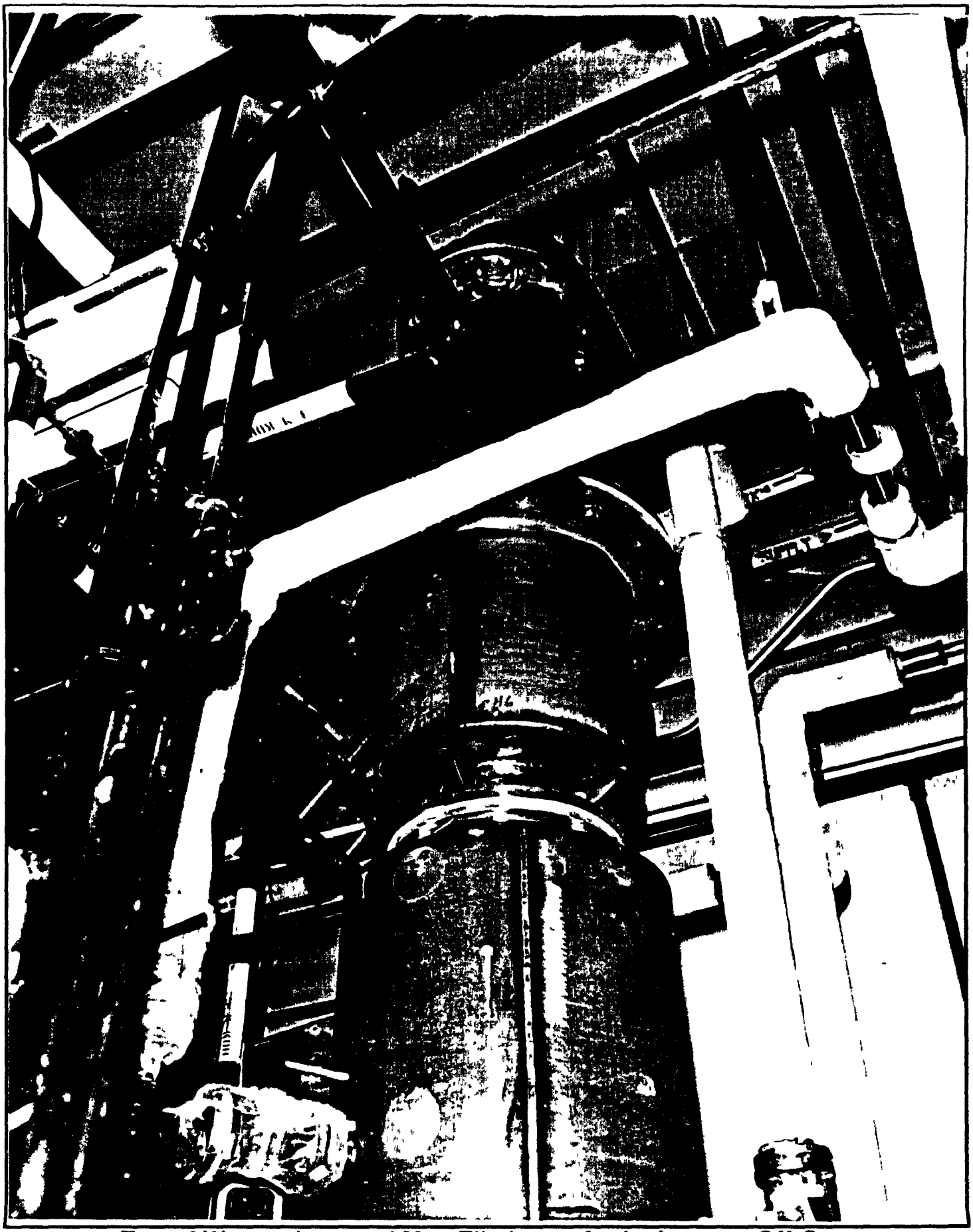


Glovebox Line 37: Barrel Dump Station

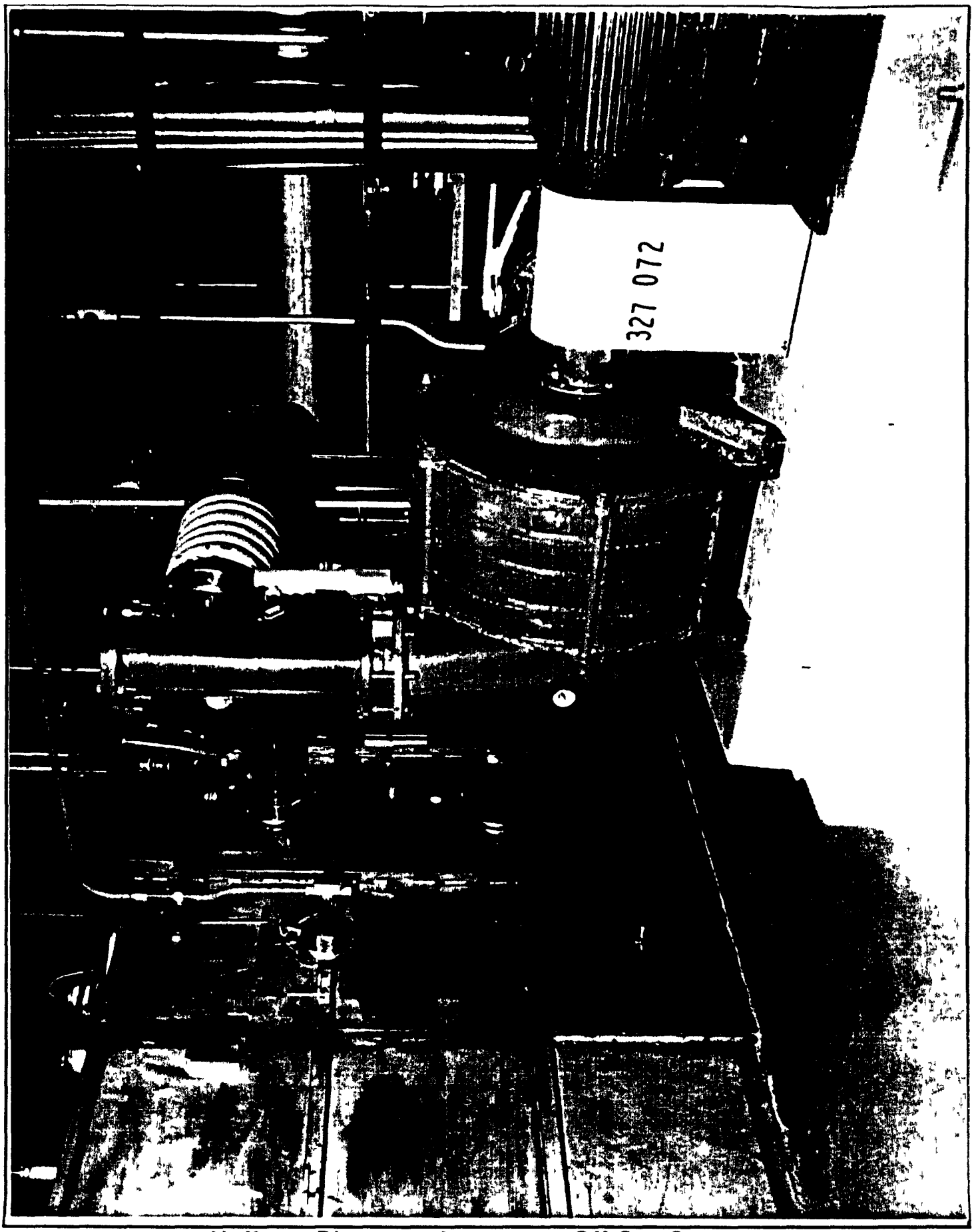
Incinerator Firebox Prior to Installation



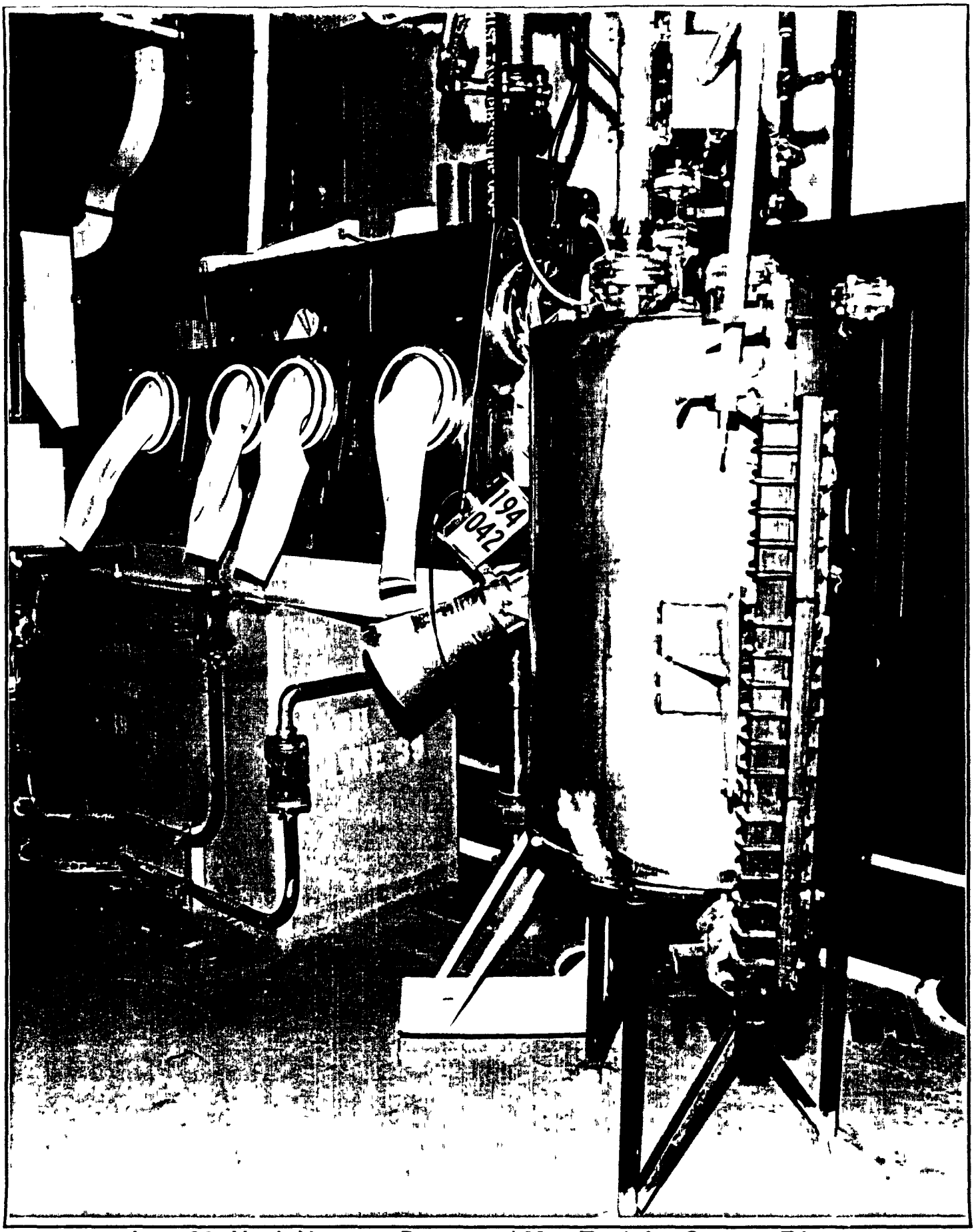
Incinerator Off-Gas Line Feeding to Caustic Spray Chamber



Top of Wet cyclone and Mist Eliminator for Incinerator Off-Gas



Hoffman Blower on Incinerator Off-Gas System



Line 39: Nash Vacuum Pump and Mist Tank for Caustic Filter

APPENDIX B

QUANTITY TAKE-OFFS OF DISMANTLED EQUIPMENT

Engineering drawings of the 771 Incinerator were used to estimate the quantities of materials that will be generated during stripout of the incinerator These quantities were calculated based on the anticipated size reduction of the equipment when packed into containers for final disposal voids will be present The exact percentage of voids is unknown, therefore a contingency void factor was used in final cost estimates and calculations It is believed that the total containerized volume of waste will be approximately 57 cubic yards This volume is only a preliminary estimate of the actual volume of waste requiring disposal

PRELIMINARY CALCULATION OF STORAGE VOLUME NEEDED FOR DISASSEMBLED INCINERATOR

LINE	ITEM #	ITEM	DRAWING #	LENGTH	HEIGHT	WIDTH OR RADIUS	# OF UNITS	VOLUME (FT^3)	COMMENTS
LINE 37 INCINERATOR									
	1	INCINERATOR	6253-1	5 3	4 00	3 3		69 93	
	2	GRATE STAND	29078-8	2 0	1 50	0 2		0 50	TOP
				0 5	0 13	0 1	4	0 03	4 LEGS
	3	PUMP	15259-13	3 0		0 1		0 06	2" PIPE
				3 0	2 00	2 0		12 00	PUMP
				1 0	1 00	1 0		1 00	MOTOR
	4	PUMP BOX	15259-11	2 6	2 00	0 042		0 22	ASSUME 1/2" THICK
				2 6	3 00	0 042	2	0 65	2 SIDES
	5	PUMP BOX CRITICALITY DRAIN	15259-12	0 7	0 50	0 5		0 17	
	6	PUMP BASE	19908	1 0		0 2		0 09	
				1 5	1 00	0 02		0 03	
	7	HEAT EXCHANGER #1	6078-1	3 0		0.5		2 36	ASSUME IT GOES INTO 55-GALLON DRUM
				2 0		0 5		1 57	(NEED 3' SECTIONS)
				2 3		0 5		1 83	
	8	BREACHING STACK	37068-1	2 5		0 6		2 83	GOES INTO DRUM
		ASSEMBLY		1 3		0 6		1 47	
	9	WATER TANK	19917	2 0		0 6	0 5	1 21	ASSUME HALVES CAN FIT INSIDE EACH OTHER
				1 8	0 17	0 2	4	0 20	4 LEGS
	10	FIRE SUPPRESSION	29391-1					1 34	10-GALLON TANK
								0 50	PIPING AND NOZZLES
	11	DRY BOX	1-6209-71	7 0	4 00	0 02		0 58	ASSUME 1/4" THICK, BOTTOM
				7 0	6 50	0 02	2	1 90	2 SIDES
				4 0	6 50	0 02	2	1 08	2 SIDES
				4 0	6 00	0 02		0 50	TOP
	12	SORTING BOX	1-6210-71	7 0	3 00	0 02	2	0 88	ASSUME 1/4" THICK
				3 0	3 00	0 02	2	0 38	
				7 0	3 00	0 02	2	0 88	
	13	DRUM HOIST	18234-1&2	6 0	1 00	0 5		3 00	
	14	CONTROL PANEL	28457-4	4 6	7 25	3 0		100 05	ASSUME 3 WIDTH
TOTAL FOR LINE 37								207.22	

LINE	ITEM #	ITEM	DRAWING #	LENGTH	HEIGHT	WIDTH OR RADIUS	# OF UNITS	VOLUME (FT^3)	COMMENTS
LINE 38 ASH GRINDING									
	1	LIFT SYSTEM	17686-10	3 00	2 00	0 17	2	2 04	CHAIN GUARD
				1 17	0 50	0 02	2	0 02	REDUCER MOUNTING WELDMENT
								1 00	MOTOR
				0 50	0 17	0 17		0 01	PILLOW BLOCK STAND
	2	LIFT MOTOR SUPPORT	17686-6	1 17	1 17	0 02		0 03	ASSUME 1/4" THICK, TOP
				1 58	0 42	0 02	4	0 05	SIDES
	3	OPERATING & CRUSHER	17686-7	2 50	0 17	0 17	4	0 28	LEGS OF #701
		PLATFORM		2 00	0 08	0 08	6	0 08	SUPPORT BARS
				1 00	1 00	0 30		0 30	STEP
				2 00	1 50	0 17		0 50	PLATFORM
				2 50	0 17	0 17	5	0 35	LEGS OF #702
								1 00	SIDES
				5 00	2 60	0 02		0 27	PLATFORM
	4	HAND SCREEN	17686-2	1	1	0 25		0 25	
	5	VIBRATION FEEDER	15529-1	1 75	1 00	1 00		1 75	
	6	DISCHARGE HOPPER & DUST HOOD	17686-6	1 6	1.3	1 5		3 12	
	7	BALL MILL	15529-2	2 83	1 67	3 33		15 74	BALL MILL
			17686-6	1 5	1 25	0 7		1 31	FEED END GUARD
				2 30	2 00	0 50		2 30	BELT DRIVE GUARD
				1 70	1 50	0 50		1 28	FLYWHEEL GUARD
				2 70	2 20	0 02	2	0 19	2 BELT GUARDS
	8	JAW CRUSHER	17686-2	?				15 00	NO DIMENSIONS GIVEN, ASSUME SAME AS BALL MILL
	9	GLOVEBOX	17686-1 &	5 00	9 00	0 02	2	1 88	ASSUME 1/4" THICK, SIDES AROUND LIFT
			15647-4	4 00	9 00	0 02		0 75	SIDE
				5 00	4 00	0 02	2	0 83	TOP & BOTTOM
				13 00	9 00	0 02	2	4 88	SIDES AROUND REMAINDER
				3 00	9 00	0 02		0 56	SIDE
				13 00	3 00	0 02	2	1 63	TOP & BOTTOM
	10	EXHAUST FILTERS	17686-1	0 67	0 67	0 25	4	0 45	DO NOT HAVE #17924-1&2 ASSUME SAME AS PLENUM
	11	VENTILATION DUCT	17686-1	10 00		0 50		7 85	NO DIMENSIONS GIVEN, ESTIMATED
	12	DUST COLLECTOR	17686-2	2 50		1 00		7 85	NO DIMENSIONS GIVEN
	13	PIPING	17686-1	4 00		0 08	2	0 17	HOSE
				5 00		0 08		0 11	PIPE
	14	CONTROL PANEL	17686-1	2 00	3 00	3 00		18 00	NO DIMENSIONS GIVEN, ESTIMATED
TOTAL FOR LINE 38								91.84	

LINE	ITEM #	ITEM	DRAWING #	LENGTH	HEIGHT	WIDTH OR RADIUS	# OF UNITS	VOLUME (FT^3)	COMMENTS
LINE 33 AIR CLEANING									
	1	HEAT EXCHANGER #2	24315-1&2	3 00	2 30	2 30	2	31 74	GOES IN DRUM, 2 HALVES
				2 20	3 00	2 30		15 18	
				3 00	1 00	2 30		6 90	
				3 00	2 00	2 30		13 80	
				1 00	2 00	2 50		5 00	
	2	CAUSTIC RETURN TANK	15259-6	4 50		1 50		31 81	
		ASSEMBLY						1 00	LEGS, ETC
	3	CAUSTIC MAKEUP TANK	15259-6					30 00	
	4	CYCLONE SUPPORT	29228-1	5 00	0 13	0 13	3	0 23	3 LEGS
		ASSEMBLY		2 50		1 00	2	15 71	TANK (ESTIMATE)
				1 50		1 00		4 71	
	5	DEMISTING ASSEMBLY	15259-7	2 50		0 75		4 42	
	6	SPRAY CHAMBER	17965-4	3 00		2 20		45 62	GOES IN DRUM
				2 50		2 20		38 01	
				2 50		0 50		1 96	
				3 00		0 25	2	1 18	PIPE OUT OF TOP CHAMBER, ASSUME 0 5' DIAM
	7	SPRAY CHAMBER	15260-7	4 00	2 00	1 00		8 00	
		OBSERVATION PLATFORM		11 00	0 17	0 17	8	2 44	8 LEGS, SUPPORTS
	8	SAFE DIMENSION SUMP	24766-6	1 00		0 29	2	0 53	2 PIPES
				1 75		0 25	2	0 69	2 TANKS
				1 00		0 17		0 09	OUTFLOW PIPE
	9	MIST TANK #5	28197-1	3 00		1 00		9 42	TANK
				2 75	0 17	0 50		0 23	SIDE PIECES
				2 00	0 17	0 17	6	0 35	LEGS AND SUPPORTS
	10	KNIFE BLADE ASSEMBLY	29194-1&2	0 75	0 33	0 83		0 21	
	11	DRUM FILTER ASSEMBLY	17953-1	0 75		0 75		1 33	
	12	Y-STRAINER	29655-410	2 00	2 00	5 00		20 00	APPROX
	13	GLOVEBOX 33	29474-3	2 50	2 00	0 02	2	0 21	ASSUME 1/4" THICK, 2 SIDES
				2 50	6 00	0 02	2	0 63	2 SIDES
				2 00	6 00	0 02	2	0 50	TOP & BOTTOM

LINE	ITEM #	ITEM	DRAWING #	LENGTH	HEIGHT	WIDTH OR RADIUS	# OF UNITS	VOLUME (FT^3)	COMMENTS
LINE 33 AIR CLEANING (continued)	14	EQUIPMENT GLOVEBOX	15259-1	3 25	2 80	0.02	2	0 38	
				2 80	2 20	0 02	2	0 26	
				3 25	2 20	0 02		0 15	
				3 30	8 50	0 02	2	1 17	
				3 30	2 20	0 02	2	0 30	
				2 20	8 50	0 02	2	0 78	
				2 20	5 50	0 02		0 25	
				3 50	0 17	0 2	5	0 49	APPROX 5 LEGS/SUPPORTS
	15	GAGE PANEL	15259-5	2 75	0 50	0 50		0 69	
	16	PIPE SPOOL	15260-5	16 00		0 42		8 73	APPROXIMATION
	17	OTHER PIPING	NONE	30		0 42		16 36	APPROXIMATION
TOTAL FOR LINE 33								321.44	

LINE	ITEM #	ITEM	DRAWING #	LENGTH	HEIGHT	WIDTH OR RADIUS	# OF UNITS	VOLUME (FT^3)	COMMENTS
FILTER PLENUM									
	1	BOOSTER BLOWER	15258-7&8	5 00	5 25	4 75	4	498 75	MULT BY 4 TO ACCOUNT FOR BUFFALO BLOWERS
		(HOFFMAN BLOWER?)		3 00		0 25		0 59	PIPE GOES IN DRUM, ASSUME 2" DIAMETER PIPE
				1 00		0 08		0 02	
				2 17		0 08	2	0 09	2 PIPE SUPPORTS
	2	PLENUM PIPING	15258-10	3 00		0 08	4	0 26	GOES IN DRUM, 3' SEGMENTS
				0 25		0 13		0 01	
	3	PLENUM SPRAY SYSTEM	15258-11	5 70		0 16	2	0 87	
	4	AIR DIFFUSER CONE	15258-14	0 50		0 33		0 17	
	5	HEPA FILTERS	38855-100	0 67	0 67	0 25	4	0 44	
	6	FIRE SCREEN	1-6251-71	2 00	2 00	0 02	6	0 50	
	7	GAGE PANEL	1-9881-71	2 75	0 50	0 02	2	0 06	SIDES, ASSUME 1/4" THICK
				0 50	0 50	0 02	2	0 01	
				2 75	0 50	0 02	2	0 06	
	8	WALK IN CHAMBER	1-9871-71	12 00	7 00	0 02	2	3 50	SIDES, ASSUME 1/4" THICK
				13 70	7 00	0 02	2	4 00	
				13 70	12 00	0 02	2	6 85	
	9	FILTER FRAME	1-9873-71	2 75	7 00	0 21	8	32 08	2 SETS FILTER HOLDERS
				1 83	0 42	0 42	16	5 08	BARS IN BETWEEN FILTER HOLDERS
				1 83	0 21	0 42	16	2 54	BARS IN BETWEEN FILTER HOLDERS
TOTAL FOR FILTER PLENUM								555.89	

TOTAL FOR LINES 33, 37, 38, AND FILTER PLENUM

1176.40 Cubic Feet

or

43 57 Cubic Yards

Note The values given are preliminary estimates of each incinerator segment to be removed
All dimensions are in feet